

## USER MANUAL

Automatic Lifting Magnet LI-120

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## Introduction

### Safety Guidelines and Warnings



- Please read this manual carefully before deployment to ensure safe use of the device
- Keep this manual in good condition and easily accessible for the operators of the device



- This device includes a source of magnetic field. A fluctuating magnetic field is produced during the use in the proximity of the device.



- This device produces a magnetic field that may interfere with medical devices such as metallic implants or cardiac pacemakers. Do not use this device and keep out of close proximity unless you have approval from the manufacturer of the medical device or from your physician



- The operator should always ensure that the use of this device meets operational instructions, local regulations and national safety regulations related to lifting and lifting equipment
- Never leave the operating device unattended despite the holding force in circumstances when the load might drop, causing the risk of damage or serious bodily injury



- Do not disassemble or replace the device parts
- The device must not be used for lifting or transporting people
- Never leave the load unattended
- Lift only one work piece at a time
- Let the people nearby know that the lift is to begin
- Always pay special attention to the factors that may decrease the holding force of the magnet
- Always stay clear of the load
- Never lift loads over people or in close proximity to people
- The permitted lifting capacity must not exceed
- Do not operate a damaged or malfunctioning device



- Do not use the device while it is connected to the battery charger. Before using the device, disconnect the battery charger from the device and from the electrical outlet.

## General Product Information

**Automatic Lifting Magnet LI-120** manufactured by Ixtur, is electrically controlled lifting equipment, which creates magnetic holding force with a permanent-magnet. LI-120 is a flexible and user-friendly device for professional use. LI-120 can be utilized either manually with operation buttons or automatically with built-in load-sensing system.

**Energy efficiency.** Automatic Lifting Magnet LI-120 has bi-stable operational structure, which means that the device does not consume energy while maintaining the magnet's ON (attached) or OFF (released) -state. Because of bi-stable structure the design solutions have low energy consumption. The switching between states is controlled with a short electrical pulse. This increases the number of lifts to over one thousand with one complete battery charge.

**Serviceability.** Automatic Lifting Magnet LI-120 has low energy consumption which has removed the requirement for an external power source. This allows a compactly integrated package with a chargeable battery. Low energy consumption extends operating time, which results to long and efficient working without interruptions.

**Safety.** Automatic Lifting Magnet LI-120 produces a magnetic holding force beneath it's magnetic lifting surface only with loads made of ferromagnetic materials. Automatic Lifter LI-120 activates the magnetic lifting surface only with a sufficiently small air gap. Automatic Lifter LI-120 leaves the magnet in its latest state ('attach' or 'release') in case the power is lost. The battery status can be checked from the device and low capacity is indicated by blinking lights. Automatic operation mode of Automatic Lifter LI-120 allows the operator to stay clear of the load during lifting without the need to go to the lifting area.

## Purpose of the Product

Automatic **Lifting Magnet LI-120** is a portable and detachable lifting equipment, which is intended for temporary lifting and transportation of loads made of ferromagnetic materials.

Lifting Magnet LI-120 is intended for such lifting operations where the use of other mechanical hoist systems would be slow or when the accessibility of either hoist system or load would be poor and would require the operator to go to the lifting area during the lift.



Lifting Magnet LI-120 is not intended for permanent attachment to load items.



In case Lifting Magnet LI-120 is used as a component, in order to integrate one or several Lifting Magnet LI-120 devices to larger lifting system, or to connect the devices to one another, permanently or temporarily, in all such cases it is the responsibility of the designer, the manufacturer and the operator of the device or the system to ensure that local and national safety regulations and general safety policies are met.

## Technical Specifications

Dimensions (Length x Width x Height): 125 mm x 125 mm x 200 mm

Weight: 6,50 kg

Holding force: minimum 360 kg (S235 S $\geq$ 12 mm)

Rated lifting capacity: 120 kg (S235 S $\geq$ 12 mm)

Residual magnetism: maximum 5 kg

Battery: 9.6 V, 2700 mAh (8 x AA / 1.2 V / 2700 mAh)

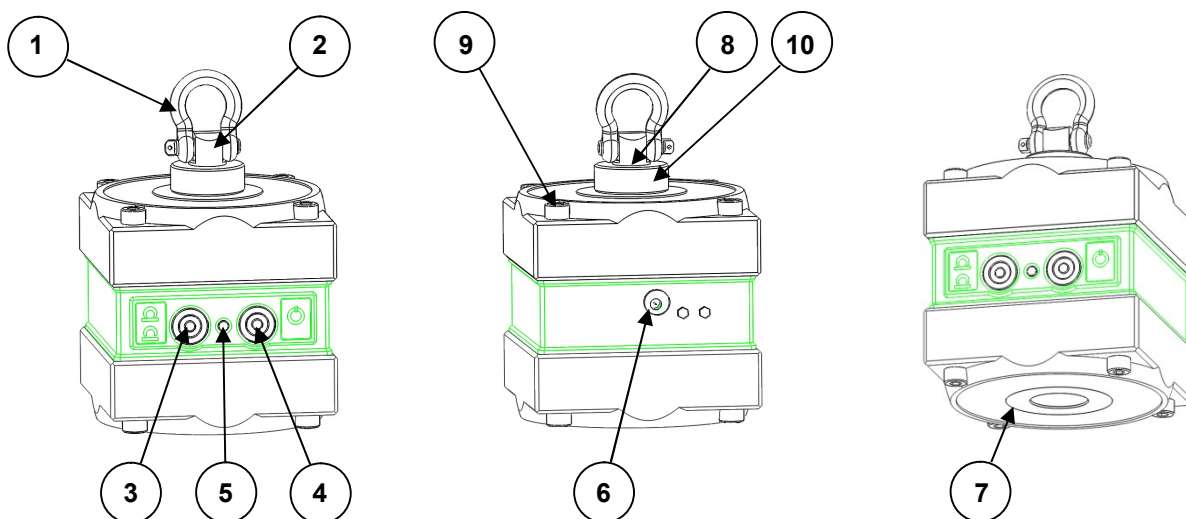
Charging voltage: 16 V DC

Environmental conditions:

- Operating temperature: 0°C ... +50°C (the magnet will not power up if the temperature is below 0 °C)
- Charging temperature +5°C ... +35°C
- Storage temperature: -20°C ... +35°C
- Humidity 0% ... 90%
- IP54 (The magnet is protected from dust and splash water)

Charging time: max. 2 h

Operational time with fully charged battery: 100 hours in standby mode or 3000 magnet activations (ON or OFF)



1. Lifting shackle
2. Lifting shaft
3. Left operation button, MAGNET ON/OFF switch / left indication light
4. Right operation button, POWER ON/OFF switch / right indication light
5. Middle indication light
6. Charging terminal
7. Lifting surface
8. Locking ring
9. Fastening bolts (M8 – 8 pcs.)
10. Shaft collar

## Warranty

The product has 12 months warranty from the date of delivery. The warranty covers material and manufacturing defects. Warranty does not cover defects caused by misuse of the product against the instructions and regulations in this manual. Warranty does not cover normal wear and tear.

## Automatic Lifting Magnet LI-120 features

### Holding Force and Lifting Capacity

Holding force and rated lifting capacity of Automatic Lifting Magnet LI-120 can only be applied to such lifting situations where the forces are perpendicular to the magnet's lifting surface. Material properties and thickness of the load also affect the holding force, as well as any non-magnetic material that separates the magnet's lifting surface from the surface of the load, for example air. Surfaces must be clean and the air gap zero to achieve maximum holding force. The load surface must be flat and it must occupy the lifting surface of the device completely.

Maximum holding force and lifting capacity of Automatic Lifting Magnet LI-120 are rated with steel EN S235, with minimum material thickness of 12 mm.

Lifting capacity is proportional to the material thickness, which is presented later in this user manual in chapter '*Material Thickness*'.

Lifting capacity is proportional to the air gap, which is presented later in this user manual in chapter '*Air Gap and Surface Quality*'.



Read carefully the characteristics related to the magnet's lifting capacity before deployment of Automatic Lifting Magnet LI-120



Lifting capacity of the device must not be exceeded



The device should be centered with the load to minimize inclination and to ensure safe lift



An inclined load causes a twisting force on the device which reduces the lifting capacity



An inclined load may slide which could cause the load to drop



The forces caused by acceleration must be considered during lifting. For example, sudden raising or lowering cause stronger forces than slow and smooth moves.

### Material Properties

Magnetic characteristics of the material being lifted affect the magnet's holding force. Primary components of holding force are the intensity of magnetic field and the magnetic characteristics that define how well the lifted material conducts the magnetic flux.

Holding force and lifting capacity of Automatic Lifting Magnet LI-120 are rated with steel EN S235. Most other steel materials produce lower holding force.

Hardened steel conducts less magnetic flux than equivalent unhardened steel. Therefore, hardened steel has lower holding force.



Lifting capacity of 120 kg is determined with steel EN S235. Most other magnetic materials result in lower holding force.

## Air Gap and Surface Quality

Any material that separates the magnet's lifting surface from the surface of the load reduces the total magnetic holding force. Reduction can also be caused by non-magnetic materials or by materials with weak magnetic qualities, such as, zinc or paint or similar coating, rust, frost or air. This manual uses air as an example.

An air gap may also increase due to rust on the load surface, foreign particles such as metal chips from welding, corrosion, and convexity or concaveness of the surface.



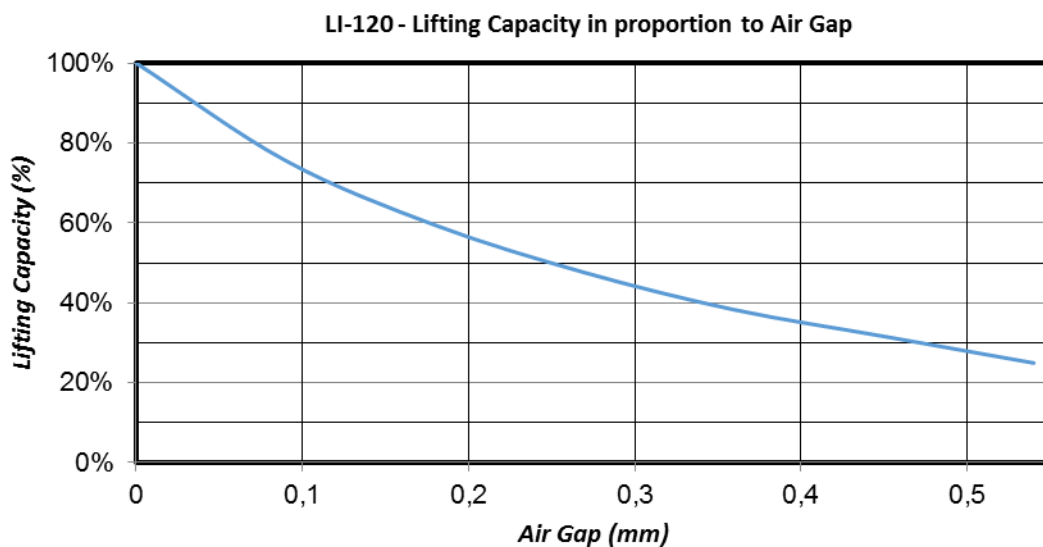
Before magnet attachment, both the magnet's lifting surface and the load material surface must be cleaned of foreign materials to minimize the air gap that reduce holding force



Due to residual magnetism, the magnet's lifting surface may contain magnetic particles or pieces which reduce the holding force



The load material surface may bend and become convex during the lift, which produces an air gap and reduces holding force. Especially thin materials may cause this effect



## Material Thickness

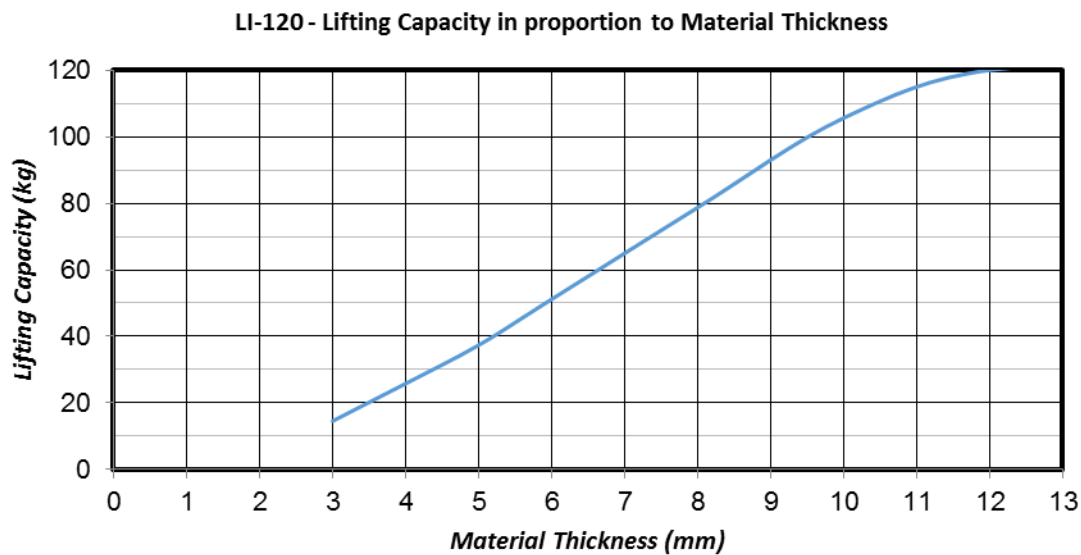
In addition to ferromagnetic characteristics of load material, magnetic holding force is affected by the thickness of the material.

The material's maximum conducting capacity for a specific magnetic field strength is achieved with a specific threshold thickness of steel plate.

When the thickness becomes smaller than this threshold, the conducting capacity of steel plate weakens, and at the same time, the holding force is reduced.

When steel plate thickness becomes greater than this threshold, the holding force is no longer proportional to thickness, as the magnet has reached its full capacity.

For Automatic Lifting Magnet LI-120, the maximum magnetic holding force in the load material is rated with steel EN S235, with minimum material thickness of 12 mm.





## Use of Automatic Lifting Magnet LI-120

### Indication Lights and Functions

Function of device / mode	Indication light / lights	Use of device
Power OFF	No lights	No functions
Start-up	Two green lights are blinking for 3 seconds	Normal use
Not starting	Blue Light blinks once	Operating temperature too low
Magnet ON (attached)	Green blinking light	Normal use
Magnet OFF (released)	Red blinking light	Normal use
Low battery voltage	Yellow blinking light	Connect the device to the battery charger
Charging	Yellow light	Wait until the battery is fully charged, then the device returns to normal functional mode
Battery status check	Blue light and Green blinking light, 2 to 9 times	Wait until the device returns to normal functional mode
<p>To reduce power consumption Automatic Lifter LI-120 shuts down automatically when it is left unused for 60 minutes. After this LI-120 can be restarted normally.</p> <p>Magnet is reset by pressing both buttons for 10 seconds</p>		

### Residual magnetism

When Automatic Lifting Magnet LI-120 is either released from the load or shut down, the magnet's lifting surface has a residual magnetic force. This residual magnetic force may lift a piece of 5 kg depending on the shape and material of the piece.

Due to residual magnetism Automatic Lifting Magnet LI-120 may collect pieces and particles not meant to be lifted. Please consider the residual magnetism of Automatic Lifting Magnet LI-120 when transporting, using, maintaining and storing the device.



Due to residual magnetism the device may lift light pieces when the magnet is released, but full holding force is not in use. Ensure always before lifting that the load is attached to the magnet and is confirmed by the green blinking indication light.



Due to residual magnetism, magnetic particles and pieces may get attached to the magnet's lifting surface; these will reduce the holding force during the lift.

Automatic Lifter LI-120 has an automatic demagnetization feature which is activated when the device senses the lifting shaft elevation in magnet's OFF-state. Due to demagnetization, less force is needed to release the load from magnet. Demagnetization stays active for 0.5 seconds.

## Product Deployment

The battery of Automatic Lifter LI-120 is charged by the manufacturer, but full battery charging is required before deployment of the device. Automatic Lifter LI-120 is ready for use right after charging. See the chapter 'Charging' later in this manual.

## Start-up and Shutdown

Turn the device on by pressing the right button for 3 seconds. During start-up, you see two green lights for 3 seconds. After start-up the indication lights show the magnet's 'normal use' mode:

Green blinking light = magnet ON (attached)  
Red blinking light = magnet OFF (released)

Turn the device off by pressing the right button for 3 seconds.

## Charging

A battery charger is shipped along with Automatic Lifting Magnet LI-120.

Automatic Lifting Magnet LI-120 indicates low battery voltage by a yellow blinking light. When the battery is empty, the device responds neither to the operation buttons nor to the movements of the lifting shaft, and the magnet's latest state remains, for example 'magnet ON' (attached). When the yellow indication light is blinking, move the device near to the battery charger and start recharging as soon as possible.

Plug the battery charger into a 100V - 240V electric outlet and connect the line cord to the charging terminal of the device. The yellow light is on during charge. Charging ends automatically when the battery is fully charged.



Detach battery charger from the device and from the electrical outlet after charging



Do not use the device for lifting when charging is ongoing

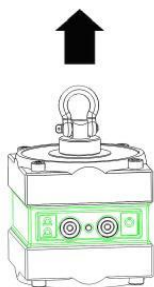


Do not use battery chargers from other manufacturers; only use Automatic Lifting Magnet LI-120 battery charger

## Automated Use

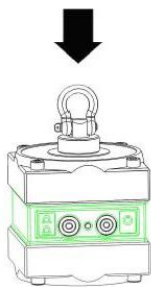
### Operating Information

Automatic Lifting Magnet LI-120 can sense the elevation of the load automatically. The device has a vertically moving lifting shaft whose position indicates whether the device is lifted up or released down.



Lifting shaft in UP-position:  
When the device is elevated, the lifting shaft goes to UP-position.

Own weight of the device keeps the lifting shaft in UP-position when the device hangs freely from its lifting shackle.



Lifting shaft in DOWN-position:

When elevation does not load the shaft, the lock spring is no longer restrained, and the shaft returns to DOWN-position.

When the lifting shaft is released (i.e. when the shaft moves from UP-position to DOWN-position), the device senses movement and changes the state of the magnet. At all other times the state is either 'magnet ON' (attached) or 'magnet OFF' (released).

### Operation instructions

1. Follow carefully the safety instructions when you connect Automatic Lifting Magnet LI-120 lifting shackle to the crane.
2. Turn the power ON by pressing the right operation button for 3 seconds. Wait until the device is in normal use state and start-up indication lights are no more shown.
3. Check that the magnet state of the device is OFF (released) i.e. red indication light is blinking. Move the crane down and place Automatic Lifting Magnet LI-120 on the load surface. Move the device downwards until the lifting shaft is released to DOWN-position.
4. The magnet state changes automatically to 'magnet ON' (attached).
5. Check that the green indication light is blinking, to ensure that the load is attached before you lift the load. Ensure there is adequate holding force before lifting, and move the load smoothly.
6. After the lift, set Automatic Lifting Magnet LI-120 and the attached load down carefully and smoothly. Move the device downwards until the lifting shaft is released to DOWN-position.
7. The magnet state changes automatically to 'magnet OFF' (released).
8. Check that the red indication light is blinking, to ensure that the load is released. Lift the device slightly off the load.

When the magnet is OFF (released), Automatic Lifting Magnet LI-120 has residual magnetic force, which can lift smaller pieces. To detach the load with less force, Automatic Lifting Magnet LI-120 activates its automatic demagnetization feature. When the device is lifted off the load, the device senses lifting shaft elevation. See chapter '*Residual Magnetism*' earlier in this manual.



Do not detach the lifting shackle from the device when you connect the device to the crane.



Ensure always before lifting that the magnet state is ON (attached) i.e. green indication light is blinking.

### Manual Use

Automatic Lifting Magnet LI-120 must be connected to the crane with its lifting shackle in both manual and automated use.

Automatic Lifting Magnet LI-120 is operated manually by using the left operation button.

When the operator presses the operation button, the magnetic state changes. At all other times the state is either 'magnet ON' (attached) or 'magnet OFF' (released). Indication lights show the magnet state:

Green blinking light = magnet ON (attached)  
 Red blinking light = magnet OFF (released)

ATTENTION! The magnet state always changes automatically to 'magnet OFF' (released) after the lift when the attached load is set down and the lifting shaft returns to DOWN-position. See chapter '*Automated Use*' earlier in this manual.

ATTENTION! The left operation button cannot be used when the shaft is in UP-position. The magnet state cannot be changed to 'magnet OFF' (released) during the lift.



Do not detach the lifting shackle of the device when you connect the device to the crane.



Ensure always before lifting that the magnet state is ON (attached) i.e. green indication light is blinking.

## Battery Status Check

Press the right operation button for 10 seconds. In this functional mode, blue light is on and the right green indication light blinks 2 to 9 times depending on the battery status, and after that the device returns to its normal use state. The number of green blinks indicates the battery charge percentage; 2 = 20%, 3 = 30% ... 9 = 90%

## Maintenance and Inspection



This device produces a magnetic field that may interfere with medical devices such as metallic implants or cardiac pacemakers. Do not use this device and keep out of close proximity unless you have approval from the manufacturer of the medical device or from your physician

Keep the Automatic Lifting Magnet LI-120 clean using mild soap and a moist wiping cloth. Do not use a lot of liquid and avoid strong detergents!

Cleaning increases the operational life time of Automatic Lifting Magnet LI-120, ensures its safe operation and helps to better identify malfunctions and damages.

### **Do not use the device if you find any broken parts or malfunctions!**

The lifting shackle can be changed by the user. Only use a 20 mm wide approved lifting shackle with axel diameter 10,0 mm that has Lifting Capacity (WLL) 120 kg or more.

Authorized Service can replace the integrated battery.

If other defective parts are detected, repairs can be made only by the manufacturer or manufacturer's authorized repair technician.

Ask your dealer about service and repairs.

### ***Maintenance and inspection within operation***

Is performed on a daily basis or at least prior to each work shift. Also whenever the device has been subjected to abnormal forces, like a strong shock or falling.

- Clean the Device and Check that the device is undamaged on the surface, without bends, dents or cracks
- Check that the lifting shaft (2) moves smoothly, without jerks. Clean and grease the lifting shaft with vaseline if necessary. Do not use oil!
- Remove all dents and spurs on the magnetic lifting surface (7) that can cause increasing air gap and decreasing holding force carefully with fine sandpaper
- Check that the lifting shackle (1) is properly connected
- Check that all functions work properly before starting work
- Before each lifting operation clean the magnetic lifting surface (7) and surface of load from dust, rust and other dirt that can increase the air gap to maximize the holding force

### ***Weekly maintenance and inspection***

Is performed on a weekly basis in addition to the daily check list. Also to be performed whenever the device has been subjected to abnormal forces, like a strong shock or falling.

- Check that the lifting shackle (1) is in perfect working condition, if not, change into a proper one
- Check products' fastening bolts (9) and tighten when required (tightening moment 27 Nm)
- Check the locking ring (8) of the lifting shackle
- Clean the membrane of the lifting shaft (under the shaft collar (10)) carefully by lifting the lifting shaft (2) and shaft collar (10) in an upright position. Also check that the membrane is intact.
- Check the magnetic lifting surface (7) of the device for flatness and wear. Uneven wear and deep scratches, dents or spurs can create an air gap between the lifting surface and load, which will reduce the lifting capacity. If more than 10% of the device's flat lifting surface is affected, it should be taken off service until the lifting surface can be reground. If regrounding is necessary, all lifting surfaces must remain flat and in the same plane. Re-testing of the holding force is mandatory after regrounding

- Check the rigid epoxy of the encapsulated coil on the magnetic lifting surface (7). If any parts of the coil are visible, take the magnet off service and contact Ixtur Ltd or your service technician

### **Yearly Check**

It is recommended that the lifting capacity should be tested at least once a year by an authorized technician.

## **Decommissioning of Automatic Lifter LI-120**

The device has electronic components and a battery. During the decommissioning of Automatic Lifting Magnet LI-120, follow local regulations for electronic device recycling.

## **Patent Pending**

Several Patent applications pending to protect the product Automatic Lifting Magnet LI-120

## **EC Declaration of Conformity**

We hereby declare that designing, manufacturing and testing of the product Automatic Lifting Magnet LI-120 complies with the Directives and Standards listed below

- Directives 2004/108/EC and 2006/42/EC
- Standards EN 61000-6-1:2007, EN 61000-6-3+A1:2011, EN ISO 12100:2010, ISO/TR 14121:2007 and EN 13155:2003+A2:2009

## EC DECLARATION OF CONFORMITY

**Ixtur Ltd.  
Varespellontie 6  
FI-21500 KAARINA  
FINLAND**

The equipment manufactured by Ixtur Ltd. which accompanies this declaration conforms to and meets requirements of the directive 2004/108/EC on electromagnetic compatibility and the directive 2006/42/EC on machinery

The product is designed, manufactured and tested in the respect of the following harmonized standards: EN 61000-6-1:2007, EN 61000-6-3+A1:2011, EN ISO 12100:2010, ISO/TR 14121-2:2007, EN 13155:2003+A2:2009

<b>Manufacturer</b>	Ixtur Ltd. VAT: FI23186135
<b>Contact information</b>	Varespellontie 6, FI-21500 KAARINA, Finland, <a href="http://www.ixtur.com">www.ixtur.com</a>
<b>Description of the product</b>	The product is lifting equipment which is meant to elevate magnetic metals and manufactured products made of magnetic metals. The product works with batteries. Rechargeable batteries are inside of the product.
<b>Commercial name of the product</b>	Automatic Lifting Magnet LI-120
<b>Identification</b>	Product includes serial number marking

### Person compiling the technical documentation

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**Authorised signatory** Markku Oksanen  
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